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VIEWS, NEWS AND INTERVIEWS.

Edward M. Davis, of Mount Vernon, N. Y., is one of the Bell Telephone Company's subscribers. It is said that he is also interested in the Duplex Telephone Company, which soon expects to establish a rival office in Mount Vernon. Mr. Davis called up the Gilsey House one day recently, and his friend, Mr. Waldo, tried to talk over the line. Manager James Shiras cut Waldo out. Davis rang till his arm ached, and then ran across to the telephone office to learn why he could get no answer. Manager Shiras told Davis that no one except Davis or his partners could talk over the wire. Davis called Manager Shiras uncomplimentary names, and Manager Shiras hit Davis on the jaw and knocked his hat off.

The French Chamber of Deputies has placed at the disposal of the Académie des Sciences the sum of $10,000, which is to be awarded to the inventor who succeeds in devising a simple and sure method of determining fraud practiced in the production of alcoholic liquor for human consumption. *Electricité* asks whether the knowledge of electrical conductivity, coupled with that of density, is not a sufficient means if the liquor experimented on is brought to the temperature of melting ice.

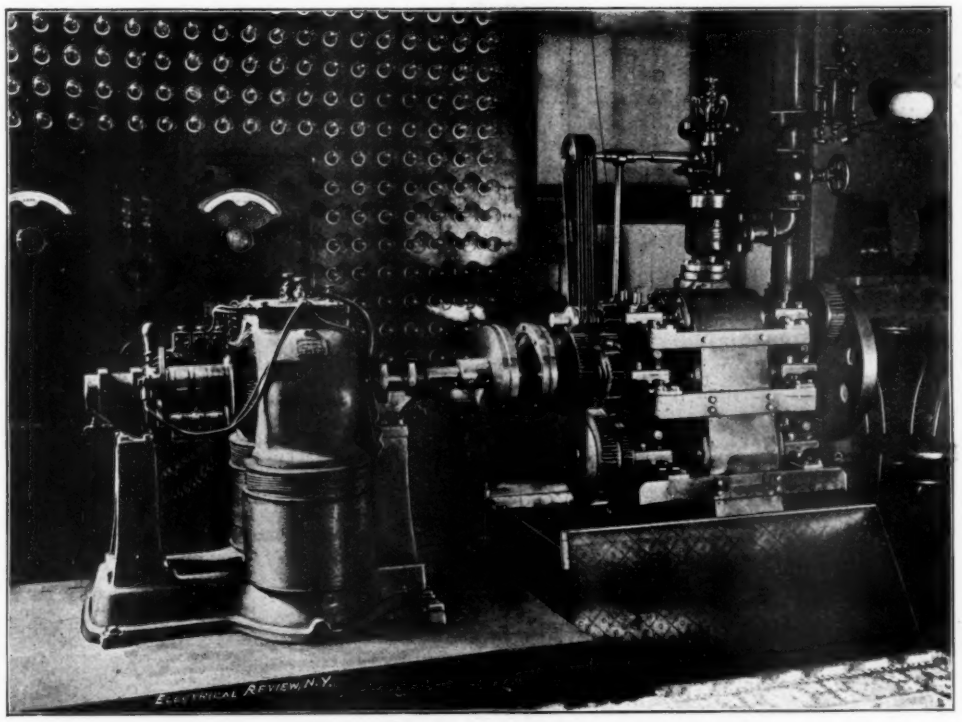
The Pittsburgh, Neville Island and Coraopolis, Pa., Railway, recently opened under such auspicious circumstances, holds a rather unique and decidedly interesting place among the local traction lines, owing to the fact that E. C. Kleineman, one of its directors, is at the same time assistant superintendent, a bondholder and a motorman of the new road.

A model of an electrically propelled submarine vessel, which it is proposed to use as a torpedo blockade runner or salvage vessel, was recently exhibited at Sydney, N. S. W., by Mr. C. S. Allen, M. I. M. E. The submersion of the vessel is attained by power, as was done by Nordenfeldt some years ago, and not by weight. The boat has a false keel, equal in weight to that of the water sufficient to fill one of the water-tight compartments into which the boat is divided. In case of accident this keel can be dropped. Several navy officers were present at the demonstration, in the course of which the boat is stated to have attained a speed of 10 knots.

A Philadelphia barber has painted a trolley pole in front of his shop a bright red and white as a mark for his business. He secured permission from the traction company to use the pole for a trade sign, and now it can be seen for several blocks up and down the street. Many now go to his shop who never knew there was a shavery in that vicinity before. There is now a run on the company's officials by other barbers who want to use the poles. In a few weeks the enterprising barber expects to have an electric hair-cutting machine.

The skipper of the fishing smack "Olive A. Lewis" attempted to get up his anchor between Sandy Hook and Long Island one morning last week, and found that it was unusually heavy. It came to the surface with an Atlantic cable attached. The skipper might have cut the cable and saved his anchor, but he decided that it was better that he should lose an anchor than the company owning this cable should temporarily lose its grip on Europe. So the philanthropic skipper let the anchor go. He would be glad to receive a new anchor from the cable company.

Reading, Mass., has voted to establish a municipal electric lighting plant to cost $50,000.



THE MORSE ROTARY ENGINE DIRECT-COUPLED TO LA ROCHE DYNAMO.

A New Rotary Engine.

The Campbell Electrical Supply Company, of 104 High street, Boston, Mass., have just secured, with their usual enterprise and good judgment, the exclusive rights in the electrical field for the sale of the new Morse rotary engine, the first one of which has recently been completed, and which we illustrate herewith.

This engine is an entirely new departure in its line, and from its high efficiency and economy of operation, as well as from the limited space it occupies, is destined to become of immense value in electrical work.

It is a compound triple expansion engine without other valves than the pistons themselves, each pair of which act as cut-offs for the following cylinder, and the steam is expanded from an initial pressure of 75 pounds to two and one-half pounds.

As will be readily seen, this gives very high economy. In the experimental plant, as shown in our illustration, the engine is direct-coupled to a 350 light compound 110 volt La Roche machine, and occupies a space of only 26x41 inches over all and 33 inches in height. The entire floor space occupied by both engine and dynamo is seven feet four inches by 32 inches.

The nominal speed is 900 revolutions, and at this speed 50 horse-power is actually transmitted. Before taking hold of this engine, Mr. R. A. Stuart, of the Campbell Electrical Supply Company, had it put through a series of the severest comparative tests at the Institute of Technology in Boston, and by these tests its efficiency was found to be fully equal to the best slow-speed engine, and 40 per cent better than the best high-speed engine.

As the available steam pressure where the experimental plant is located

is only 60 pounds, a load of 350 lights is carried.

These are of the Century type, manufactured by the Campbell company, and the fact that out of this quantity not a defective light has been found speaks pretty well for their quality. They are mounted on a handsome oak bank board, in the center of which are mounted a Keystone ammeter and voltmeter and the necessary switches and controlling apparatus.

The working of the entire outfit is most satisfactory, and the Campbell company are now better than ever prepared to handle orders for the complete equipment of electric plants, having everything necessary for such installations in their own hands.

A 150 horse-power engine is now being built to order, and others will follow rapidly.

THE SIEMENS COMPANY.

A COMBINATION OF SIEMENS & HALSKE, WELLS-FRENCH CAR COMPANY AND GRANT LOCOMOTIVE WORKS.

The big fire in the lumber district of Chicago on August 1 swept out of existence, among others, the plants of the Siemens & Halske Electric Company of America and the Wells-French Car Company. Mr. O. W. Mysenburg is president of both these concerns. The Siemens & Halske company had contracts on hand which it was imperative should be fulfilled. With commendable promptness Mr. Mysenburg leased for one year at a rental of $12,000 the Grant Locomotive works at Cicero, just outside of Chicago. These works had been lying idle and were in the hands of receivers owing to financial difficulties. They are splendidly equipped for the needs of the Siemens & Halske company, and possession was taken at once and the work of the company destroyed in the fire was begun again with good prospects of completing it within the contract time.

Now comes a report that the three concerns named above have formed a combination under the name of the Siemens company, which will make electrical apparatus, cars and locomotives. It is probable that the new company will engage between 1,000 and 2,000 men to operate the entire plant. Over 600 will be put to work immediately. The company will make an investment of several hundred thousand dollars in enlarging the Grant works. The real capital of the combined companies is much more than the $2,000,000 of the new capitalization, for the Siemens & Halske Company of America was stocked at a greater sum itself and the Grant company was capitalized at $1,000,000. The Wells-French company also represented over a half-million dollars' investment.

FIG. 2.—ARMATURE OF MANCHESTER MOTOR.

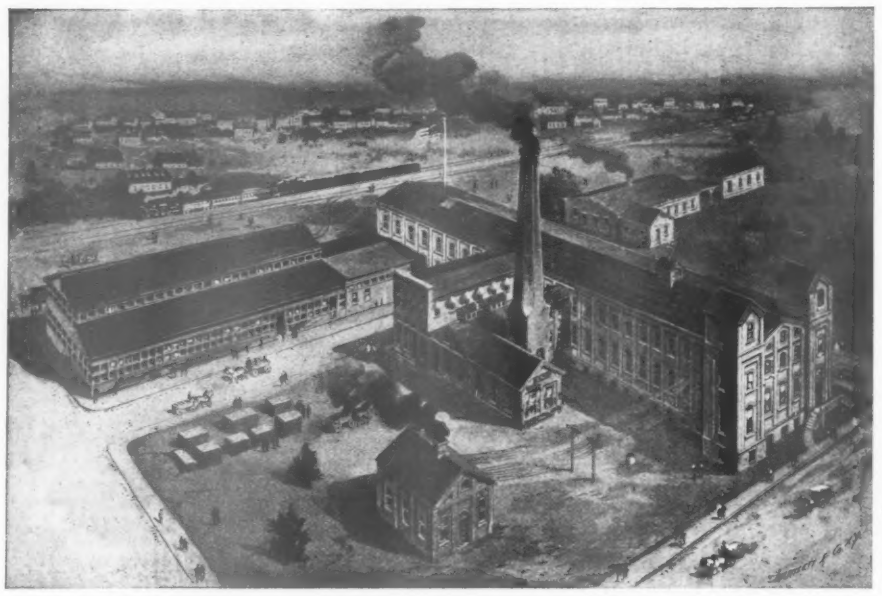


FIG. 1.—FACTORIES OF THE MATHER ELECTRIC COMPANY, MANCHESTER, CONN.

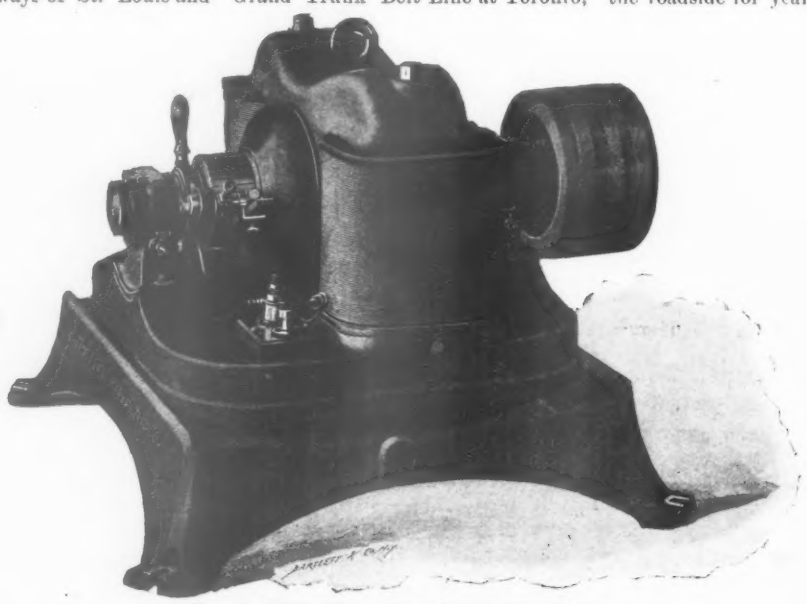


FIG. 3.—MANCHESTER TYPE SLOW SPEED MOTOR.

ELECTRIC RAILWAY NOTES.

The Akron & Cuyahoga Falls Rapid Transit Company are in the market for two or three closed car bodies, one of which will probably be with part of one end arranged for transporting mail, express matter and baggage. Address Thomas F. Welsh, manager, Akron, O., or W. E. Hall, secretary, Hamilton, O.

The introduction of mail cars on the street railways of St. Louis and Brooklyn has raised the question whether such a use of the West End lines might not be of advantage to the public in Boston and its environs. There is no doubt of it.

It having been stated that the Grand Trunk Belt Line at Toronto, Ont., would soon be converted into an electric system, Mr. Edmund Wragge, manager of the Grand Trunk at Toronto, asked as to the truth of the statement, answered: "The company has been looking into the matter, but no decision has been reached. The great difficulty of adopting the electric system would be on account of the section of road between the Union Station and the Don, where the trains are so numerous. The expense of operating such a system would not be any less than at present."

Mr. J. Gilson Coleman, late of the Lehigh Traction Company, has accepted the general managership of the Yonkers, N. Y., Electric Street Railway. A new management has taken charge of this road and an increased and improved plant will be installed. It is supposed that the Johnsons, of Johnstown, Pa., and Cleveland, Ohio, are backing the company.

It is estimated that the receipts on the latest West Chester extension of the trolley system average daily something like $30 to every car. The daily cost for running a car is put at $2.50, repairs included. Wages are a little less than $6 per day per car. These estimates are partly official and partly not, but lower Westchester County seems to have been sitting on the roadside for years past just waiting for the trolley to come along. When it came everyone jumped on, and in three months the trolley has become part of the daily life of the people.—*New York Sun.*

THE PLANT AND APPARATUS OF THE MATHER ELECTRIC COMPANY.

A LIVE MANUFACTURING COMPANY AND ITS EXTENSIVE WORKS AT MANCHESTER, CONN.

The plant of the Mather Electric Company, covering a number of acres, is situated at Manchester, Conn., three hours on the train from either New York or Boston, directly on the main line of the New York & New England Railroad, which, together with a spur track running directly into their erecting shop, allows them to load heavy generators directly on the cars and gives them the best of facilities. They have recently completed an extension to their plant in the form of an iron building 300x50 feet for an erecting shop, constructed by the well-known Berlin Iron Bridge Company, of East Berlin, Conn., and fitted with a 50 ton Shaw electric traveling crane, which, together with a large amount of new machinery which the Mather company has recently installed, consisting of heavy planers, boring mills, radial drills, lathes, etc., enables them to handle large generators up to 500 kilowatts, and larger, in capacity. The Mather Electric Company are making a specialty of both belted and direct connected work, especially for railway and power purposes. Their facilities for testing generators, from the smallest to the largest, under the most severe conditions, are second to none; their steam plant being especially arranged and adapted for this purpose. The Mather company already contemplate another extensive addition to their plant in the early future, to accommodate large work and a new battery of boilers and engines especially for testing this class of apparatus. The entire plant of the Mather company is operated by electric motors, the sizes varying from five to 50 horse-power, which system of transmission and subdivision of power they have found exceedingly satisfactory and economical in the operation of their works.

One of the standard products of the Mather company is the Manchester type of slow speed motor, shown in Fig. 3. The armature of this motor is illustrated in Fig. 2. The magnetic and mechanical design of the motor is symmetrical and the armature lies very near the base of the machine. The efficiency is high, sparking at the commutator is entirely absent and the machine may be run indefinitely under full load without heating. The fields are of cast-steel and the base and sub-base of cast-iron, making a light and strong construction. The fields are wound on well insulated metal bobbins and can be easily slipped on and off. The bearings are self-oiling and have composition bushings of long life. The armature is proportionately large and is of the ironclad type with Siemens winding, giving the requisite slow speed. The shaft is large in diameter and of the best machinery steel. The sheet iron disks, of which the armature is built up, are treated by a special Mather annealing process, which, together with a proper proportioning of wire, prevents destructive heating. The armature is carefully balanced and runs true. Mica is used throughout for insulation. The commutator is large and carefully built of pure lake copper drop-forged bars. Each part of the motor is made to jigs and templates, and thus any part can be duplicated from stock.

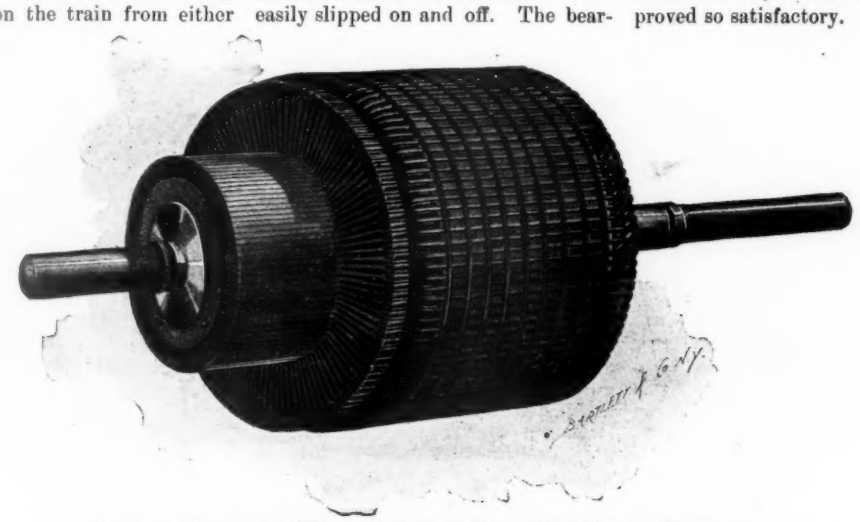


FIG. 4.—ARMATURE OF MATHER 250 HORSE-POWER MULTIPOLAR GENERATOR.

The Mather Electric Company have met with much success in the introduction of their new multipolar generator, shown in Fig. 5, for electric lighting and especially for electric railway work. The company have contracts for the installation of a number of these generators, some of which are of very large capacity, for railway work, both in the East and West. The company will shortly enter with more activity than ever into the railway field with these new generators for belted or direct connected work, which have already proved so satisfactory.

Fig. 5 shows one of these improved Mather multipolar generators in the 250 horse-power size. The armature is shown in Fig. 4. These generators are designed to be belt driven or direct connected to the shaft of the engine, and, being reversible on their bed plates, can be run in either direction at will by making a slight change in the connections. They are self-oiling, self-exciting, self-regulating, and, after being started, completely self-attendant. The multipolar generators are all compound wound and entirely self-regulating, and equally well adapted for electric lighting, electric railway or power purposes. The railway generators are wound for a nominal voltage of 500, but having a rheostat in the field circuit the potential can be raised to 600 volts without undue heating, and even 50 per cent overloads will be borne for short periods without injury to the machine. The bearings of these generators are self-oiling. Automatic alignment is secured by the use of ball bearings. The supports for the bearings and the entire bed plate are cast in one piece, a construction which gives great strength and rigidity to the bearings and secures great freedom from vibration. There are four sets of brushes, each brush held in an independent holder, hence any single brush can be raised from the commutator without disturbing the others, and each having its own spring may be perfectly adjusted. The diametrically opposite brushes are of the same polarity and are connected. The rocker arm of the brush holder is of rigid construction and the different parts are perfectly insulated; it is designed so that it will adjust all the brushes simultaneously.

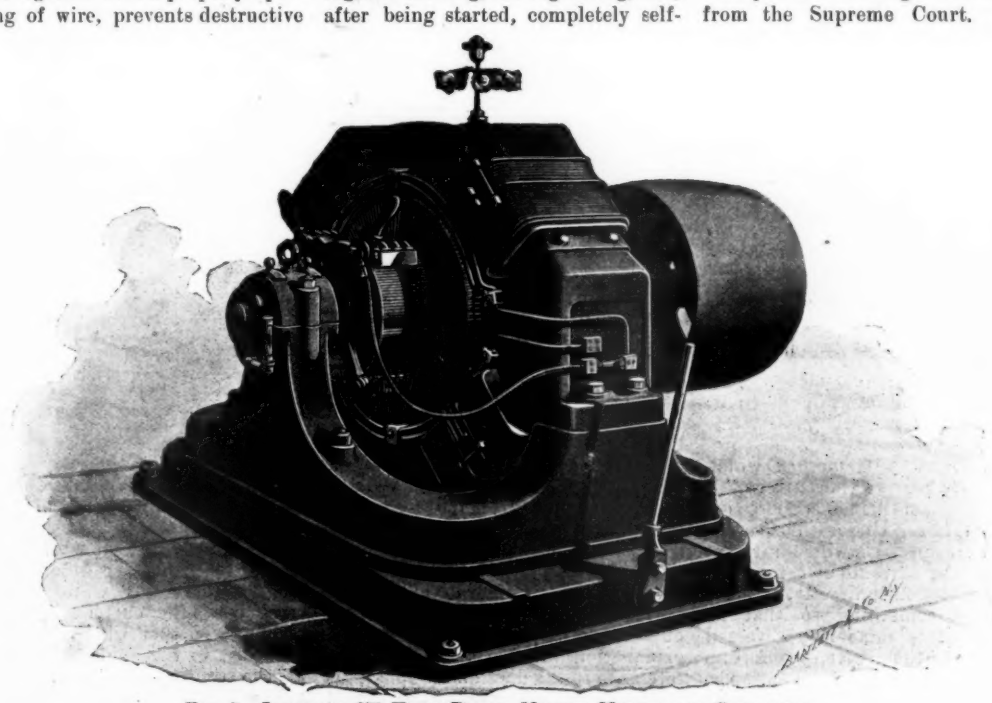


FIG. 5.—IMPROVED 250 HORSE-POWER MATHER MULTIPOLAR GENERATOR.

Bridgeport Traction Company vs. Consolidated Road.

Judge F. B. Hall of the Superior Court, on August 13, gave a decision modifying the injunction restraining the Bridgeport, Conn., Traction Company from crossing the tracks of the Consolidated Road, so that the crossings may be made. He states that the public act, which was passed after the private act granting a charter for an electric road to the Traction company, does not prohibit or limit the terms of the latter. Three similar injunctions in New Haven County, the Court says, have been refused, and therefore he cannot consistently continue this in force, no decision on the question having been received from the Supreme Court. Judge Hall, however, says the crossing should be constructed in a proper manner by efficient workmen and at a proper time, the Traction Company giving the steam road suitable notice.

Forty-three trolley cars are now running daily on the Germantown, Pa., branch of the People's Traction Company, of Philadelphia.

A RELIABLE METHOD OF RECORDING VARIABLE CURRENT CURVES.

READ BEFORE THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, PHILADELPHIA, MAY, 1894, BY DR. ALBERT C. CREHORE.

INTRODUCTION.

A practical problem that has in more recent years presented itself to the electrician and physicist alike is "How shall we measure the exact current which flows in a conductor at any instant of time and record all the irregular changes to which it is subject?" Probably everyone who has thought of such matters at all has considered this problem in some of the phases which it presents. The importance of the question, since the introduction and extensive use of the alternating current, has emphasized the fact that we need a "reliable method" of measuring the instantaneous values of a current, which is not a "method by points," but a "method which continuously records the current."

Under a "method by points" is included any method in which the current is obtained from readings (usually of an electro-static voltmeter) due to the charge of a condenser which may be connected in at any point of time. The essential characteristic of the method is that the current is supposed to repeat itself exactly during successive periods, or more generally when the conditions are exactly repeated. There can be no doubt that the current does repeat itself under exactly similar conditions, but can we be sure that those conditions are exactly repeated? By this method a number of points are found, the time occupied being at least several minutes, and the collection of points properly arranged is a representation of the current during as short a time as the one-hundredth of a second, perhaps. Yet this method has proved to be a very useful and practical one, and has given us information concerning the currents and potentials of generators and transformers which is of paramount importance. Yet all will agree that this "method by points" is too limited in its application, and does not show us any sudden temporary change taking place in a current which does not repeat itself. Such for instance as a sudden "make," or "break," or "change" in alternating current, would not be easily shown by this method. The second method, previously designated "a method which continuously records the current," is the one to which this paper more particularly refers. Under this head is included all methods which attempt to record the current by causing it, either directly or indirectly, to move a material something so that its displacement is some single valued function of the current. As an example of this method may be mentioned the well-known experiments of Froelich in which a telephone is used, upon the disk of which is mounted a mirror that permits a beam of light to be reflected from it. Any vibration of the disk gives an angular motion to the ray of light and this motion is in turn recorded upon a moving photographic plate. Other examples might be mentioned in illustration of this method, for instance, a wire which is deflected in a magnetic field, or stream of mercury so influenced; but it will be noticed that in all of these cases an appreciable amount of ponderable matter is required to be moved backward and forward during each reversal of the current. When the current reverses hundreds of times per second, the unavoidable difficulty is introduced that the forced oscillations of this ponderable matter, no matter how small in amount, become so superimposed upon those of the current which it is desired to measure that they are inseparably mixed together; and the record does not show the true current, but the resultant vibrations of the instrument. That this is the case with the method of the telephone, above referred to, has been established beyond a doubt, it seems, by experiments conducted at Cornell University by Mr. Henry Floy. The current furnished to the telephone was carefully measured by the "method

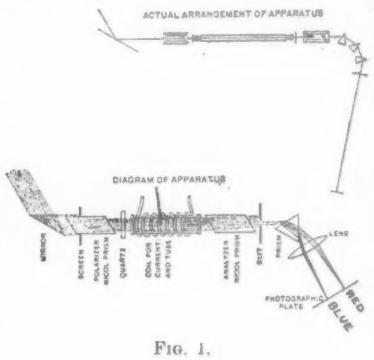


FIG. 1.

by points," and care was taken to see that the current as measured by points was the same as that used in the telephone. The vibrations of the telephone did not even approximately agree with the current as measured by well-established methods.

Bearing these points in mind, and remembering the high frequency of some of the oscillations which it is desired to record, may we not with some degree of certainty predict that any of these methods requiring the rapid motion of ponderable matter will be open to precisely the same objections which are noticed in the case of the telephone? Without answering this question, probably all will agree that the difficulty may certainly be avoided by using as a vibrator, instead of this so-called "ponderable matter," a vibrator that has no weight. It is to this question of finding a form of vibrator without weight that I invite your attention.

THE WEIGHTLESS VIBRATOR.

The idea of the weightless vibrator is, perhaps, already suggested in the beam of light. But how shall we cause a beam of light to have a change in direction simply by means of a current flowing in a circuit without the intervention of some moving material? A way of influencing a beam of light directly by an electric current (or more properly by its magnetic field) is that discovered long ago by Faraday. It is by means of the discovery of the rotation of the plane of polarization by an electric current that I propose a method of obtaining a weightless vibrator. The explanation will be made clearer by reference to the diagram of apparatus (Fig. 1). A beam of light is passed through a polarizer (Nicol prism) so that the vibrations of the beam take place in only one plane upon emergence. If it is then passed directly through an analyzer (Nicol prism) the latter may be set at such an angle as to prevent all light from passing through it, and thus produce darkness beyond the analyzer. Faraday's discovery was that, if a beam of polarized light is passed through some substance in the direction of the lines of magnetization within that substance, there is a rotation of the plane of polarization in a direction which is the same as the direction of the current required to produce such a magnetic field. The direction of rotation is unaltered, therefore, whether the light beam advances in the same or the opposite direction to the magnetization, so that a beam reflected back and forth through the substance several times has its rotation increased by equal amounts each time. If the direction of the ray of light be at right angles to the lines of magnetization there is no rotation produced. The amount of this rotation has been carefully investigated by Verdet, who announced laws by which it may be expressed. They are summed up in the following statement: "The rotation of the plane of polarization for monochromatic light is in any given substance proportional to the difference in magnetic potential between the points of entrance and emergence of the ray;" that is, it is equal to a constant times this difference of potential and is expressed by the formula

$$\theta = v\,V. \qquad (1)$$

where θ = angle of rotation, V = difference in magnetic potential, and v for a given wave-length is constant in any one substance. This constant is known as Verdet's constant. If now the light is passed through polarizer and then through a tube containing the substance used, around which is wound a coil of wire, and thence through the analyzer, an observer would find complete darkness upon looking through the analyzer when set in the crossed position. But if without moving the analyzer a current is sent through the coil on the tube, light appears to the observer. This is because the plane of polarization has been rotated by the current and practically the prisms are no longer crossed. Now let the analyzer be rotated while the current is still flowing, and the observer will see a series of beautiful colors through the analyzer, a different one for each position of it; but, as long as the

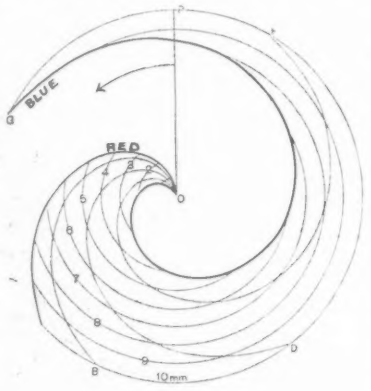


FIG. 2.

current flows, he cannot produce darkness again by any amount of rotation of the analyzer.

This effect suggests what is known to be a fact, that the different wavelengths composing white light are rotated by the current in different amounts, so that when the analyzer is turned to the angle corresponding to the yellow light, say, only the yellow light is prevented from passing through the analyzer. All the other rays, being rotated by different amounts, pass through the analyzer, and there being mixed together they give rise to the series of beautiful complex colors above mentioned. A different color is seen for each position of the analyzer, because in each position a different color is subtracted from white light, and the observer sees what is left or merely the complementary color.

The law which tells the amount of rotation given to the different colors is pretty accurately known; and theory in this case is in close accord with the observed facts. The equation which closely expresses the amount of the dispersion for the different wave-lengths may be written:

$$v = c\,n^2 / \lambda^2 \left(1 - \frac{\lambda}{n}\frac{dn}{d\lambda}\right). \qquad (2)$$

where v is the so-called Verdet's constant, λ the wave length, and n the index of refraction of the medium. c is a constant for any one medium, which is, however, inversely proportional to the permeability of the medium. This is a formula at which Maxwell arrived from his theory of molecular vortices, and we shall see how closely it is in accord with observation. We see by this formula that Verdet's constant depends not only upon the wave length, but upon the index of refraction corresponding to that particular wave length, and also upon the rate of change of the index with respect to the wave length. If this rate of change of n with respect to λ is small, as would be the case with a substance where the dispersion is small and the index of refraction regarded as approximately constant, then it is seen that the formula reduces to an extremely simple form, viz.:

$$v = \frac{c^1}{\lambda^2}. \qquad (3)$$

Here Verdet's constant is inversely proportional to the square of the wave length. Using this approximate form for the present, we see from Verdet's law, equation (1), that

$$\theta = vV = c_1, \frac{v}{\lambda^2}. \qquad (4)$$

But the difference of magnetic potential, v, is

$$\frac{4\pi_1.Si}{10},$$

where Si is ampere turns, and thus we have

$$\theta = 4\,\pi c_1.\ Si/10\,\lambda^2 = c_2\,i/\lambda^2. \qquad (5)$$

where

$$c_2 = 4\,\pi c_1.\ S/10. \qquad (6)$$

A reference to Fig. 2 will show this relation between angle of rotation, wave length and current. Several spirals are shown, corresponding to the several lines of the spectrum, known as A, B, D, F and G. The radii of the circles which intersect these spirals are proportional to the current flowing in the circuit, while the angle, which the radius, drawn to any point of intersection, makes with O P represents the rotation for that particular wave length and current. The red and blue spirals indicate that the red rays are not rotated so much as the blue. The direction of rotation in the diagram is as indicated by the arrow. Now, returning to the observer looking through the analyzer, if he could resolve the light there seen into the pure colors of the spectrum, what he should expect would be, with no current, a complete spectrum, since all rays are rotated by the current. But let him rotate the analyzer, and he finds that first one color then another disappears, and a dark band is seen to move across the spectrum as he rotates the analyzer. Again, let him rotate the analyzer to a certain angle and leave it there while he varies the current. He should expect that the band would move, but would vanish entirely with zero current, and thus prevent observation for small currents.

(To be concluded.)

Conducive to Brevity.

"What is the difference between a cablegram and an epigram?"

"Not much. Cablegrams are apt to be epigramatic when the rate is 40 cents a word."—*Puck.*

The Vitiation of the Air by Different Illuminants.

In a circular issued to its customers by the Cleveland, O., Electric Illuminating Company appears the following interesting and convincing argument in favor of the incandescent electric light:

Any method of lighting whereby the oxygen of the air is consumed and noxious gases imparted thereto by the process of combustion is a source of danger to life and health. The burning of any substance to produce light, be it gas, oil or a candle, in the open air, is sure to greatly increase the heat of the atmosphere, and also to add poisonous gases thereto in proportion to the substance consumed and the amount of oxygen required for combustion.

The following table, carefully prepared and verified by scientific authorities of high standing, will at once demonstrate the fact in a forcible manner.

The following table shows the oxygen consumed, the carbonic acid produced and the air vitiated by the combustion of certain bodies burnt, so as to give the light of 12 standard sperm candles, each burning at the rate of 120 grains an hour:

Burnt to give light of 12 candles, equal to 120 grains an hour.	Cubic feet of oxygen consumed.	Cubic feet of air consumed.	Cubic feet of carbonic acid produced.	Cubic feet of air vitiated.	Heat produced in one pound of water raised to 10 degrees Fahr.
Cannel gas	3.30	16.50	2.01	317.50	195.0
Common gas	5.45	17.25	3.21	348.25	218.6
Sperm oil	4.75	23.75	3.33	356.75	233.5
Kerosene	4.45	22.30	3.54	376.30	332.6
Paraffine	6.81	34.05	4.50	484.05	261.9
Camphene	6.65	33.25	4.77	510.25	325.1
Sperm candles	7.57	37.85	5.77	614.85	351.7
Wax	8.41	42.05	5.90	632.25	383.1
Stearic	8.82	44.10	6.25	669.10	374.7
Tallow	12.00	60.00	8.73	933.00	305.4
Incandescent electric light	None.	None.	None.	None.	13.8

Advantages of the incandescent light as above stated: It has practically no effect on the temperature of a room; it is absolutely free from noxious qualities of gas or oil, which can only be prejudicial to health; it consumes no oxygen whatever. In fact it combines the maximum of light with absolutely no impurities.

Electric Power From British Coal Fields to London.

B. H. Thwaite and James Swinburne have submitted to the Manchester Association of Engineers a plan for transmitting power from the South Yorkshire coal field to London, with trunk lines for serving the large towns along the line of transmission, including Derby, Nottingham, Leicester, Northampton, Bedford, etc., and possibly an auxiliary station in South Staffordshire for the service of Wolverhampton, Birmingham and the industrial areas in the line of its route across to the point where it joins the main trunk line serving the metropolis. The plan is to generate power by burning coal at the pit's mouth, and to transmit the power electrically. The coal will first have its "residual products" removed. As these form the most valuable portion of the coal, the fuel actually used may be itself fairly regarded as the residual product of the distillation. Gas engines are to be employed instead of steam engines and boilers, and the power is to be transmitted by high pressure alternating currents.

The Partridge Carbon Company.

The extensive and well equipped works of the Partridge Carbon Company are located at Sandusky, Ohio. The company makes a specialty of electric light carbons and carbon motor brushes. The quality of these goods has been highly recommended and the substantial appreciation of the company's patrons is shown by the large and increasing number of orders received. The claim is made that the Partridge carbon brush will wear 25 per cent longer than any other, besides keeping the commutator in proper condition. Both hard and soft brushes are made and samples are cheerfully furnished. The capacity of the Partridge Carbon Company's factory is 15,000 motor brushes and 35,000 electric light carbons per day. The company's business is rapidly extending under the careful and experienced management of Mr. James Partridge. Mr. J. S. Speer, the secretary of the company, is a well-known and careful business man.

Trolley Car Parties.

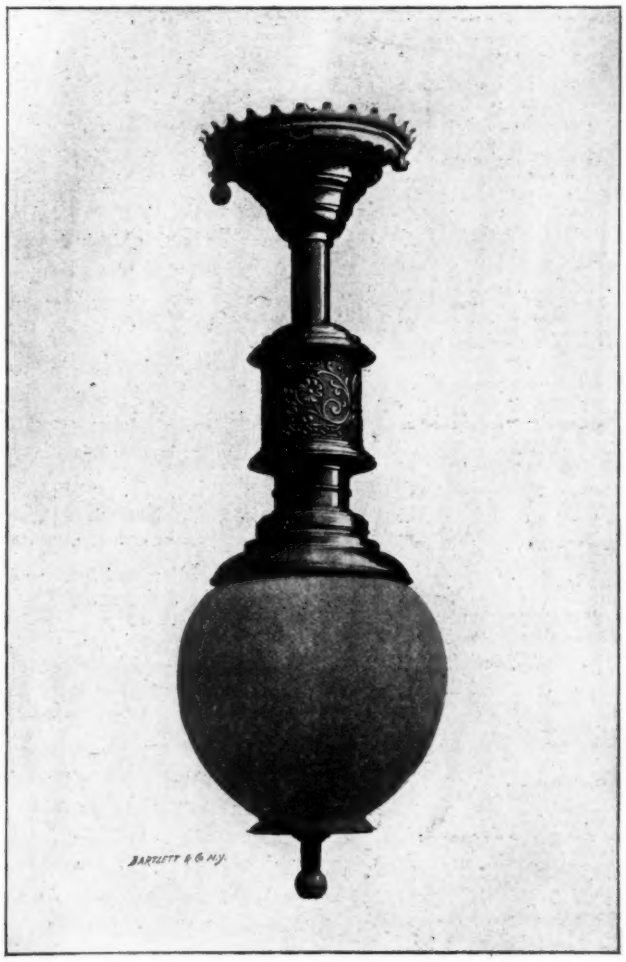
The introduction of the trolley cars, which provide not only a means of transportation, but an easy and enjoyable ride, have given rise to "trolley car parties." The Tenth and Eleventh streets company in Philadelphia has arranged so that a car can be chartered for a round trip for $6 and all the passengers that can be accommodated are allowed to ride. No stops are made and the cars go whizzing along at a delightful pace.

Batavia, N. Y., has accepted its new municipal electric light plant, which up to this time has been on trial.

The Manhattan Incandescent Arc Lamp.

The Manhattan arc lamp, recently placed upon the market by the Manhattan General Construction Company, 50 Broadway, New York city, was illustrated and described in detail in the ELECTRICAL REVIEW for June 27, 1894. The latest form of this lamp is shown in the accompanying illustration.

Some very exceptional advantages are claimed for the Manhattan lamp, which, if substantiated in commercial service, will give it an enviable reputation second to none. The principal claims made for this lamp are that it will burn singly with economy on incandescent circuits, avoiding the necessity of placing two lamps in series; the 2,000 candle-power lamp requires but four amperes of current; one pair of half-inch carbons will burn 80 hours without retrimming; an enclosed globe acts as a perfect spark arrester and prevents the collecting of insects in the globe; the lamp gives a perfectly steady white light free from shadows; the mechanism contains neither clock work, levers, dash-pots, racks, nor carbon rods.



MANHATTAN INCANDESCENT ARC LAMP.

The Ball Electric Light Company last week cut off the electric lights in Hempstead, Long Island, and now the citizens are in a quandary as to how the village shall be lighted. The company thinks the village authorities have no authority to contract for electric lighting under the village charter. It will supply no more lights to the village until the charter is so amended that a legal contract can be made.

ELECTRIC LIGHT FLASHES.

The Common Council of Centerville, Mich., has decided to light the streets of the city with electricity.

It is reported that a company will at once begin preparations to heat the village of Fredonia, N. Y., with electricity.

The name of the Cleveland General Electric Company has been changed to the Cleveland Electric Illuminating Company.

The plant of the Chillicothe, Ohio, Electric Railway and Light Company has been appraised at $30,000 upon an order of sale from the court.

The village of Wyoming, Pa., has decided to increase its indebtedness in the sum of $15,000 for the purpose of erecting a plant to provide the borough with electric light.

Niles, Mich., has purchased the Niles Electric Light and Power Plant for $37,500. The power is to be utilized, in addition to furnishing light, to furnish water for a new waterworks system.

A notice from the Health Department was served last week on the Edison Electric Illuminating Company, of New York, directing the abatement of the nuisance arising from cinders from the company's plant in West Twenty-fifth street.

A system of electric lighting is being put in at Juneau, one of the best known of Alaskan settlements, but a place nevertheless of only 2,000 inhabitants. When completed, this will be the first central electric light plant in the territory. Electricity, however, is not altogether new in Alaska. It has been used for some time in a limited way in the mines. Water power is abundant everywhere, and the current is generated on the streams and carried to the mines by cables.

The comparative earnings of the Edison Electric Illuminating Company, of New York, for July were as follows:

	1894	1893	Increase
Gross	$36,648.08	$30,874.33	$5,773.75
Net	39,727.82	33,497.37	6,230.45
Seven Months.			
Gross	$774,402.68	$690,729.48	$83,673.20
Net	415,372.50	315,800.15	99,572.35

The Edison Electric Illuminating Company, of Brooklyn, N. Y., makes the following comparative statement:

	1894	1893	Increase
July Gross	$27,139	$18,257	$8,882
Net	8,697	5,106	3,591

The various representatives of the Standard, Chaudiere and Ottawa Electric Light Companies, of Ottawa, Ont., met last week and formally amalgamated the three companies into one, to be known as the Ottawa Electric Company. The officers elected were: President, Mr. T. Ahearn; vice-president, Hon. E. H. Bronson; directors, Messrs. G. P. Brophy, G. B. Pattee, C. B. Powell, J. W. McRae, Robt. Blackburn, Hon. F. Clemow, Wm. Scott. Mr. Dion, of the Chaudiere company, will be superintendent; Mr. G. F. Macfarlane, of the Standard, secretary-treasurer; and Mr. D. Street, of the Chaudiere company, will be accountant. The capital stock of the company is $1,000,000 with a paid-up capital of $645,000.

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What has become of the Johnson-Lundell underground conduit system? We trust it has not gone the way of all the others.

News comes from Milwaukee that "Alderman J. L. Kiichli has dropped his plan of trying for an injunction to shut off the electric lights of the city." Glad to hear that. And now if Mr. Alderman will drop a few of those unnecessary letters out of his name, perhaps he won't be thinking up such silly plans as shutting off a large city's electric lights.

THE BLACKENING OF WALLS BY STRAIGHT CURRENT CONDUCTORS.

Electric light engineers have long known the fact that a direct current conductor, when attached to a white wall, will soon produce a dark strip on the wall. Several explanations of the cause of the discoloration have been offered, but it was left to the ingenuity of G. A. Nellis to point out the facts of the case. His statement is as follows:

Whenever a straight current passes through a conductor it creates all around it a magnetic field of a given intensity. This field affects the circumambient air, which principally consists of two gases—oxygen, being strongly magnetic, and nitrogen, a well-known dia-magnetic gas. By the attraction of oxygen a great many solid particles suspended in the air are drawn to the conductor and deposited upon it, while on account of the dia-magnetic quality of nitrogen another large number of particles are repelled and hurled against the walls where they form a black deposit.

Of course, this phenomenon takes place only with direct current conductors. Using the alternating current no such deposit can be observed, and thus the discoloration of a wall to which a conductor is attached is at once an indication of the character of the current passing through the wire. Mr. Nellis lays great stress upon the advantage which in this respect the alternating current has over the direct current, especially for lighting private residences.

Steamship advices last week announced the death of one of the ELECTRICAL REVIEW's oldest and most esteemed subscribers, His Majesty Somdetch Phra Paramindr, Maha Chulalongkorn, Supreme King of Siam. The sad news has not been confirmed by cable and we sincerely hope that it will not be. The ELECTRICAL REVIEW, which has always stood in high favor with the royal families of foreign countries and our own aristocracy, does not desire to lose so distinguished a patron. We hope that this will meet the living eye of His Supreme Majesty, and that he may live many years to read and enjoy the ELECTRICAL REVIEW—the price of which is but 25 yems per year. *Vive le roi Chulalongkorn!*

Since the Niagara Falls agitation the people generally are looking up their idle water powers and figuring how to put them to paying use as generators of electricity. There is going to be an increased market for water wheels.

The best way to hurry up good times is to talk good times. The blue-visaged croaker has no place in the immediate future.

THE BEARING OF THE TARIFF LAW ON BUSINESS.

The time which has elapsed since the passage of the tariff bill has been sufficient to determime with some degree of accuracy the effect it will eventually have upon the various industrial enterprises of the country. The terms of the measure can be dismissed without comment, except to say that it is sufficiently broad in its provisions to meet Treasury needs—a condition not to be found in the original Wilson or House bill. This, after all, from a financial point of view, is the main thing. It will have the effect of putting the government's finances in a condition that will no longer cause distrust at home and abroad.

It is assumed by all interests that the President will either sign the bill or allow it to become a law by reason of the 10 days limitation. His trip to Gray Gables indicates that he will not act thereon, if at all, much before the expiration of the constitutional time. Business interests have had the bill before them for months, and the progressive have, to a man, calculated the effect which it will have on their respective lines of business. It has not been completely discounted owing to the uncertainties regarding its final enactment. However, in a general way business has either been gradually conforming to its terms or has been suspended. Now that it is before the country in reality, industrial enterprises are taking an inventory of the past and reckoning on the future. They find that the promised change of a basis has stagnated the trade of three seasons, and has arrived too late to greatly benefit that of the fourth or Fall business of this year. They find, moreover, that this paralysis has thrown hundreds of thousands into idleness. During the pendency of the bill concerns have discounted time and its effects by reducing wages. So general has been this policy that competent authorities estimate that the wages of bread winners of the United States have, on the average, been reduced from 10 to 25 per cent—a reduction thought by many to be a basis demanded by the new bill. Concerns which have not carried this policy for specific reasons will, as a rule, be forced to the action in order to retain a firm position in the industrial world. Thus, even before the bill was enacted its first great effect was to reduce wages. The effect of the immediate future will be to cause a further adjustment of operations to the specific terms of the bill. The majority of concerns have reduced their stocks of raw material or finished products, as the case may be, to the minimum, thus lessening the effect of any change which the law may create in the values thereof. The consumer, owing to his lower wages, has demanded reductions, which demand has been met, and the lower cost of staples has materially increased the purchasing power of his

wage. This readjustment has by no means been general, but considering the short space of time and the uncertainties of final action on the bill it has been progressive.

Importers have been keeping close to shore, as the 40 odd million dollars worth of goods in bonded warehouses will testify. Withdrawals of these stocks will commence immediately after the bill becomes operative. That a gradual resumption in business on the new basis will follow is practically certain. The various factors mentioned preceding have reduced stocks in first, second and third hands to a minimum, and the actual necessities of 65,000,000 of people are becoming clamorous. The resumption will be slight at first but will become accelerated as the months pass. The talk of our industries being killed by the new law is regarded as the mouthings of party-blind calamity howlers. There may be a few industries which after the general readjustment will not find it possible to operate, but they will be found in the list of those which were always on a rather shaky financial basis.

The great majority will continue and in time regain their old activity. Without going into the question of protection or free trade, it can be said that the cheaper raw material will go far toward offsetting the reduction in the amount of protection offered various industries. There is no shadow of a doubt in the intelligent mind that the American or Americanized workman is as skillful as his brother across the water, or that his employer can operate as cheaply as his foreign competitor, being given the same set of conditions. This again leads to a reference of the wage question. As a result of the new law they will be less, and the employé must in turn look to cheaper costs in order to maintain his purchasing power at par.

The European investor looks with favor on our new tariff. As a result of its enactment he expects to see a prompt revival of business. This feeling will do much to contribute to the end it anticipates through an investment on a larger scale in our industrial enterprises.

Aside from the effect of the tariff on the general business the important factor is the crop situation in the West. For two weeks reports have been that the damage to the corn belt would destroy the purchasing power of four States. Recent advices contradict this, and the action of the directors of the Burlington (a corn railroad), Friday, in declaring the regular quarterly dividend, reflecting confidence in the future.

Wall street is inclined to regard the passage of the Senate tariff bill with favor, believing that it means a gradual expansion of business. This feeling was reflected in higher values for stocks and bonds during the week, and a gradually broadening market. The first indication of any improvement will be railroad earnings. These should be watched very closely by students of the situation.

Prof. S. F. B. Morse and Early Photography.

Before 1838 Prof. Samuel F. B. Morse was a good painter of portraits, but, like many other good painters, made little money, says the New York *Sun*. He was continually experimenting with electrical and mechanical devices, but was hampered in his work by lack of funds. He was a great friend of George W. Prosch, a maker of instruments on Nassau street, and of Prosch's brother-in-law, Henry E. Insley, who made brooms on the Bowery. Professor Morse visited Europe and became acquainted with Louis Jacques Mandé Daguerre, who was then perfecting his invention of obtaining *fac-simile* copies of objects by chemical action of the sun. This process was originally discovered by Daguerre and Joseph Niepce, but Niepce died in 1833, and Daguerre followed the work alone so successfully that the process, when ready to be given out to the world in 1839, became known by his name. Professor Morse learned the art of making daguerreotypes from Daguerre, and returned to the United States in 1839 ready for work.

He went to his friend Mr. Prosch, and together they made the necessary instruments. According to Mr. Insley, Morse and Prosch made the first daguerreotype of still life, and Professor Draper, who had become interested in Daguerre's work, made the first life portrait by this process. Professor Morse had an interest in the gallery on Broadway and Liberty streets, run by Insley and Prosch. Very likely the invention of the electric telegraph was the result of the revenue he derived therefrom, for Professor Morse was financially stranded until the daguerreotype boom set in. It was a real boom, too. The French daguerreotypes had attracted much attention at a fair at Niblo's Garden some time before, and when the process was put in practical use in New York business grew beyond all anticipation. According to Mr. Insley the first good daguerreotype was a picture of one of Professor Morse's relatives.

PERSONAL.

Mr. Brainard Rorison, widely known in electrical circles, sailed for Europe last week on the "Paris."

Mr. A. E. Winchester, an electric light commissioner of South Norwalk, Conn., called at the ELECTRICAL REVIEW office last week.

Oxford University has conferred the degree of D. C. L. upon Professor S. P. Langley, of the Smithsonian Institution, of Washington, D. C.

Since his recent stroke of paralysis Professor Helmholtz has lost his memory of everything that has happened to him since his accident on the steamer on his way home from America.

Mr. E. R. Stettinius, of Chicago, treasurer of the Stirling company, manufacturers of the widely and popularly known Stirling boiler, has been an Eastern visitor for several days, looking after the growing business of his company in this field.

NEWS FROM BOSTON.

THE ASSOCIATION OF EDISON ILLUMINATING COMPANIES HOLDS ITS ANNUAL MEETING.

The annual convention of the Association of Edison Illuminating Companies, which was held in this city during the three days of August 14, 15 and 16, was exceedingly well attended, and was voted the most successful in the history of the organization. Headquarters were established at the Hotel Vendome, and everything was done by those having the matter in hand to insure the comfort and convenience of the delegates, and to contribute to their physical as well as mental enjoyment.

The first two days of the convention were devoted strictly to business, and two sessions were held each day. Many papers of great interest were read and freely discussed, and officers were elected for the ensuing year. Briefly stated, the business of the convention was conducted as follows:

The Tuesday morning session was devoted to the admission of new members, the report of the Committee on Lightning Protection, Crosses and Grounding of the Neutral, the appointment of Messrs. Beal, Field and Weeks as a Committee on Election of Officers, and the reading of a paper by Professor Marks on a "Board of Control," and one by Mr. Hale on "Boiler Tests." These, with the animated discussions which followed, occupied the morning session.

After the roll call and at the opening of the second session Mr. Van Vleck's paper on the "New York Company's Switchboard" was read, as were those by Mr. Page on "Incandescent Lamps," Mr. W. S. Barstow on "Low Tension Arc Lighting System," and Mr. Pierce on "Methods of Electrical Distribution Used by the Boston Illuminating Company."

The morning session on Wednesday was devoted to the reading and discussion of papers by R. R. Bowker on "Storage Batteries," in conjunction with one by Mr. Lieb on the same subject. Both papers were read by the latter gentleman. The president then appointed Messrs. Lieb, Ferguson, Marks and Edgar a committee on storage batteries.

The second session was opened by an address by President Coffin, of the General Electric Company, after which a paper was read by Mr. Emmet on the "Advantages of the Direct and Alternating Current."

After a vote of thanks had been tendered to the Boston Illuminating Company, the New England Telephone and Telegraph Company, the West End Street Railway Company and others, for courtesies received, the business meeting adjourned.

Thursday was spent in sightseeing, and visits were made to the power house of the West End road, the station of the Edison Illuminating Company on Atlantic avenue and the plant of the General Electric Company at Lynn. All hands then proceeded to Marblehead, Mass., as guests of the General Electric Company, and enjoyed a dinner at that celebrated resort.

The next meeting of the association will be held in Detroit, August 14, 1895, and the officers for the ensuing year are as follows: C. L. Edgar, of Boston, president; A. L. Smith, of Appleton, Wis., vice-president; W. S. Barstow, of Brooklyn, N. Y., secretary; J. W. Lieb, of New York, treasurer.

The Westinghouse Electric and Manufacturing Company, through their Boston office, have just closed two good contracts for electric equipments, one with the Skowhegan and Norridgewock Street Railway Company, of Maine, and one with the Rutland, Vt., Street Railway Company, who have just adopted electricity as a motive power.

In the first-named contract is included a 100 horse-power generator, and both roads will use the new No. 12 motor, similar to those recently put in by the West End.

By far the most important addition to Boston electrical circles for a long time past is the recent advent of the Fort Wayne Electric Corporation, who have opened offices and a capacious salesroom at 17 Federal street.

The Fort Wayne company under the old regime were never able, for certain well-known reasons, to obtain a footing in this market, but now that they have broken loose entirely from past associations, one of their first steps has been to establish a branch office here, and they intend making a determined effort for a share of the trade. When it is known that the New England territory will be under the immediate charge of General Manager E. I. Garfield, their success in this undertaking seems pretty well assured.

Gen. B. F. Peach, Jr., will also make the Boston office his headquarters, and the salesroom will contain samples of all the apparatus manufactured by the Fort Wayne corporation.

While the business of the corporation has heretofore been confined chiefly to the West and South, the reputation of Mr. James I. Wood, the electrician of the corporation, is as well known here as elsewhere, and is a sufficient guarantee of the electrical and mechanical perfection of the apparatus which will be put on this market.

The Société d'Encouragement has awarded its grand gold medal for 1894 to Lord Kelvin. This medal is awarded to Frenchmen or foreigners whose labors have had the greatest influence during the preceding six years on the progress of French industry. Lord Kelvin is now cruising on the Mediterranean with a party of notabilities on Sir John Pender's yacht, "Electra."

A small delegation of citizens from Louisville, Ky., called at Mayor Gilroy's office last week, and in the absence of the Chief Executive, Secretary Willis Holly entertained them. Their mission is to look into the electric subway system in New York, as Louisville is at present considering subway matters.

THE GERMAN PATENT SYSTEM.

INTERESTING REPORT TO THE COMMISSIONER OF PATENTS BY EXAMINER BISSING, OF THE UNITED STATES PATENT OFFICE —THE GERMAN SYSTEM COMPARED WITH OUR OWN.

BY GUSTAV BISSING.

(*Concluded from page 83.*)

PATTERN PATENTS.

The most interesting feature of the German Patent Office, however, and one in which to me at least they are distinctly ahead of our American practice, is in the matter of their pattern patents. We may have been a long while in coming to the conclusion, but it certainly is at least recognized, by our best thinkers, at least, that a patent system is not a system of monopoly and oppression, but is a system to protect property and to prevent theft. If a man spends a number of years of his life in devising an absolutely new machine which will do work that no other machine has ever done, which works on a new principle and which adds to the comfort and prosperity of his people, it is understood, of course, that the labor which is spent in devising this machine gives him a property right for a time at least in the result of his efforts. If a literary man writes a letter to a friend, the law has long been that this letter considered as a literary production remains the property of the writer. If a playright devises a play, he is protected from having another one steal his best ideas. If an author writes or even compiles a book, no matter how simple or how devoid of merit, no one else can appropriate his work. If a draftsman puts down a few lines in the shape of a new design, no matter how unskilled or crude, the law gives him that design for his own use for a reasonable period. That is to say, it is recognized that in intangible as well as tangible property, honesty is the best policy.

And yet, if a mechanic, no matter how skilled, takes months and months to produce a new machine, if the broad parts and combinations of the machine are old so that it does not come strictly within the law defining inventions, he receives no protection. He cannot take a design patent because such patents look primarily to beauty and not to utility. Yet when this mechanic has worked six months upon his machine, has changed this part and that, has made this heavy and cumbrous lever light, has filed down this crank and added a little knob to that wheel so as to make the elements easier to cast, and altogether has gotten a successful commercial article, he has certainly gained a certain property right in his exact machine. Why should we deny him protection and leave the results of his efforts to be appropriated by anyone who has the necessary dishonesty of purpose? Nor is this a rare case. It is a case which happens every day. Again and again do inventors come to this Office with practical commercial articles which are in advance of anything which the Office can show them in the way of a reference and which required months of work and perhaps thousands of dollars to perfect, and yet because they are lacking in that indefinable quality called invention, the Office is obliged to refuse them a patent and allow any pirate to buy one of their machines at low cost, use parts of it for patterns and build new machines therefrom with which the original deviser cannot compete, because he has a lot of work and expended capital to take into account in the price of his machines. I believe this is one of the reasons why the Office frequently allows patents on the mere chance that they may perhaps be sustained because the examiners feel that the man has a sort of property right in the specific thing which the law ought to protect even if it does not.

The Germans are, of course, more in need of such a system of pattern patents than we, because they are very much more strict in patents for invention. Since their Supreme Court decided that design patents were not intended to cover this species of property, and since it was clearly recognized that there was a species of property in productions of this kind, the law covering so-called patterns by patents was enacted. The object of this law is to draw a sharp line between such things as are recognized by the eye and such things which are useful in the sense of the patent law, but it is now confined to mere patterns in the sense of the mental founder. The law recognized at the same time that a sharp line could not be drawn between an invention, such as is worthy of a patent for invention and a mere pattern. But this difficulty did not deter them from passing the law and attempting to protect what they recognized as being a species of property. They overcame the difficulty by allowing an applicant to file both an application for an invention and simultaneously therewith an application for a pattern patent, and in case the application for the invention was finally rejected, the applicant could take his pattern patent as of the original date of filing. The fees in these pattern patents are also considerably less and the term of the patent is shorter. The law excludes chemical substances and mixtures as well as processes. The question of invention is, of course, not examined into; nor is the question of novelty by the Office, but merely by the courts. How far the question of equivalents and of minor changes are investigated does not appear as yet to have been settled, but it seems reasonable to suppose that the courts will give a pattern patent which has a great margin of novelty a wider scope than one which has a narrow margin. The law has met with the outspoken approval of all classes interested. In fact, it was because I have long since felt the necessity of some such law for our country before even the German law had been passed or was known of here, that I was so much interested in visiting the German Patent Office. I have always believed that the novel results of any effort gave a property right for a limited time at least in the novel features of the article produced by the effort and one which the law could and should protect. The fact that it might be a little more difficult to protect this kind of property is no reason why we should not attempt to protect it any more than we should not protect copyright or should decide all difficult law suits for the defendant. Honesty is the best policy in this as in other matters, and piracy should not be permitted. A study of the German system has convinced me that the difficulties are not great, but small, and my experience with manufacturers and inventors in this country makes me feel certain that the introduction of such a system as this in the United States will be heralded as a boon by all honest manufacturers. Such pattern patents would go hand in hand with our patents for inventions. They need not be searched for novelty and, if a reasonable term, say 10 years, were given, the Office would be spared the trouble of handling an untold quantity of improvements in minor matters in which it is difficult to tell whether invention does or does not exist. If our Office is in danger of criticism by reason of granting patents on margins which are too small, nothing could remove it from this danger more certainly or more quickly than a system of pattern patents, for in cases of reasonable doubt an applicant could be denied a patent for his invention and yet could be given a patent for his pattern. Such legislation would place us abreast with Germany in a matter of public honesty, in which we seem now to be somewhat behind. For certainly we cannot claim to be thoroughly honest so long as we allow piracy of ideas in mechanical matters when our courts exercise the utmost liberty in preventing such piracy in matters of art, of design, of literature, of music and dishonest competition in trade.

Of course, the system of pattern patents in Germany is in its infancy and the vice-president, who has this matter in special charge, admitted that many ideas would have to be more sharply drawn and more closely defined than they are at present. Pattern patents are granted not merely for statical articles of manufacture, but for parts of machines and machines themselves. Thus a chimney cleaner, a stove, games and toys, railroad cars, car seats and pipe joints are all subjects of pattern patents. There is an examination of the application for these patents as to their form and substance, but no search for novelty. A claim is required precisely as in the case of patents for invention. Ten thousand applications for these patents were received in 1892 and some twelve thousand in 1893. This shows what the German people think of this new system.

One feature of the German law in regard to these pattern patents, which could be adopted by us in case it should decide to protect patterns, is that of requiring an actual use of the invention within two years to insure the validity of the grant. It is the very essence of patterns that they are built for immediate use. The new points about them are, as a rule, developed from an actual construction of the machine, and the reason for seeking protection lies in the fact that the applicant wishes to put the articles on the market. The incorporation of such a limitation in any law protecting patterns would, therefore, be fair and just.

The Germans throw out references which are over a certain age. This is a point in favor of which much may be said, but which I shall not now discuss.

The president of the German Patent Office has the power of appointment and controls the various departments through his personal influence for the sake of harmony and uniformity of practice and the best interests of the service. In addition to this he is a member of the annulment and of the appeal boards.

The Patent Office in Switzerland is located in Bern and occupies some eight rooms of a recently erected government building, which gives it sufficient space to transact its business. As the number of applications received is comparatively small, the Office is not in need of a very large force, and in fact there are engaged in the active work of examining applications but four examiners who report directly to the head of the Office, who has the title of director. This reminds us very much of the earlier days of the United States Office, when the number of assistants was no larger than those now employed in Switzerland, and when all work was directly controlled by the commissioner. Nevertheless the director of the Swiss Office is not satisfied with the amount of his present force and hopes for an increase in the near future.

The Swiss patent law provides indirectly, at least, for an examination as to novelty, and it cannot be doubted that in future as the system grows this examination will be made more and more thorough. At the present time, however, it is apparent that the small number of assistants cannot pretend to make a search which shall have the merit of thoroughness, for the arts have so advanced that we, on this side of the water, find 150 assistant examiners hardly adequate to cover the ground. It is needless to say then that four assistants cannot have that detailed knowledge of the arts which must be committed to their charge necessary for completeness in search.

Again, the materials from which the search is made are extremely insufficient. The Swiss patents are arranged according to classes, but the German, the English and the United States patents have not been classified. Even the number of text books on any given subject is extremely limited. The chemical examiner, for instance, who at the same time serves as an electrical and textile expert, has at his disposal on the subject of chemistry the well-known hand-book by Wagner on Chemical Technology, an excellent work to be sure, but one which is frequently studied by candidates for admission into our Office as fourth assistant examiners. It is recognized by the members of the Swiss Patent Office that their search is incomplete and the practice of searching at all is kept up more because it is recognized to be a step in the right direction than because it is considered to be efficient as now practiced.

Another peculiar system about the search in Switzerland is that all proceedings relating thereto are strictly confidential. That is to say, if an examiner finds what he considers a reference, he informs the applicant thereof, who may either abandon his application or insist upon its allowance despite of the reference. The Office is then bound to allow the patent if the other requirements have been met, and all correspondence relating to such reference is thereafter kept secret and is not open to the inspection of the public, of litigants or even of the courts. It seems anomalous that the courts themselves may not obtain all the information at the disposal of the Patent Office in regard to any particular patent which has passed through the Office, but the director made the categorical statement that this was the case and that even the courts would not be entitled to any information regarding references which may have been developed in the progress of an application through the Office. This certainly shows a spirit of protecting the inventor which in theory at least is highly praiseworthy.

Although the search for novelty, as above indicated, is very fragmentary, the examination of an application in its formal aspects seems to be quite as rigid and severe as with us in the United States. Permission was kindly granted me to go over a number of pending applications and to look into the actions which had been made. I found a great similarity, indeed, with the points of our American practice. Perhaps this is not surprising when we consider that after all the correct form of an application, its clearness of description and its definition of claims are all matters which inhere in the subject of patent applications and for which within certain limits there can be but one correct solution. Nevertheless it is interesting to find that in the five years during which the Swiss Office has been organized, the officers having

in charge the granting of patents have so quickly struck upon correct theories in matters of description, illustration and drawing of claims.

To mention generally some formal requirements which are made, it may be said that in claims the elements are required to be positively recited and are not allowed to be included inferentially or by statements of operation. The applicant must draw his claim for his device and its elements, but may add to the end of the claim a statement of the operation of these elements. This is strictly in accordance with our own practice. Again, as to the matter of division, it is said that the doctrine of genus and species is in full force. An applicant may show a number of modifications and draw a generic claim; he may then have a sub-generic claim which shall cover all but one of the modifications, another claim which is subordinate to the sub-generic claim which may cover one or more of the modifications covered by the sub-generic claim, and so on precisely as with us.

The mode which is adopted for informing applicants of any criticisms which the Office may make upon the formal aspect of their applications is by returning the applicant one copy of their specification with penciled interlineations and notes of change which are desired by the Office. The applicant thereupon adopts as many of these changes as he sees fit and may ask for a reconsideration as to some requirements which he does not care to comply with. This may require several actions on the part of the Office before the application is in proper form. The application must be put in proper form for allowance within six months after filing the application, which is certainly an extremely short period. An appeal from the decision of the director is allowed to an officer, who corresponds to the Secretary of the Interior, and from him another appeal is allowed to the members of the cabinet taken as a whole. The period within which this appeal must be filed is four weeks.

A very peculiar feature of the Swiss law is that patents for invention are only granted for such inventions as have been actually embodied in a corporal model. The mere ability to represent the invention by a model is not sufficient; the actual construction of a model is demanded. The reason for the incorporation of such a feature into the Swiss law lies in the fact that, when the adoption of a patent law was under consideration, there were some enemies to the proposed system and it was only possible to get any law protecting industrial property by making a compromise. The enemies of the system did not wish to have chemical substances protected and they, therefore, demanded that the ability to represent the invention by a model should be a pre-requisite for its patentability. Not satisfied with this, however, they insisted that a model should actually be constructed and succeeded in grafting this feature upon the law. In consequence, not only are chemical substances excluded, but processes as well.

This feature of the law gives the examiners in the Swiss Office a very great deal of trouble. A number of regulations have to be adopted which would otherwise be unnecessary. As the director is very solicitous about the prestige of the Office, he insists upon having the most rigid proof of the actual existence of a model before allowing an application. He does this not because he believes in the provision of law which requires an actual model, but simply because he wishes to grant patents which shall not be overturned in the courts. One way of proving the existence of a model is, of course, to send it to the Office, but in case this is impracticable the director may appoint an expert of his own choosing to examine the model wherever it may happen to be found, even if this be in a foreign country, and report upon its existence to him. Most of these models are returned to the applicant after the allowance of the application, but models in some classes of invention are retained by the Office. Thus, for instance, the models in fire alarms and clocks are held also as specimens of articles in which it is difficult to determine the characteristic properties.

It is possible, however, to receive provisional protection without actually constructing a model, in which case a provisional patent is granted. If the proof of an actual model is then furnished within three years. the patent becomes "definite;" if no such proof is furnished within the time stated the patent lapses. During the time that a patent is provisional, that is to say, when no proof of the existence of a model has been furnished, the applicant is not entitled to bring a suit for infringement, but is, on the other hand, protected against subsequent inventors and publications which may thereafter be made. In closing this branch of the subject, I may say that the last words of the director in the Swiss Office, upon bidding me farewell, were in the nature of a greeting from one sister republic to another with the ardent wish that the feature requiring models may soon be canceled from the Swiss laws. The director, in other words, is a strong believer in protecting all kinds of industrial property, and I cannot but believe that his faith and energy will be successful in removing at an early date this blot upon the Swiss statutes.

A British Electric Carriage.

In addition to providing for the protection of inventions by patents, the Swiss law gives a protection for new designs. There is no requirement that the design should ever have been actually embodied in an article, the reason being that there was no need of making any compromise when the law protecting designs was enacted, since there were no opponents to such law. In fact in one province of Switzerland, that of St. Gallen, there is a civil organization protecting designs which enjoys the protection of the local courts, and to which the members of the organization submit amicably. These local manufacturers at St. Gallens being actively engaged in the manufacture of articles into which new designs entered have long since seen the necessity of preventing the appropriation of new designs by others, a proceeding which very soon degenerates into a general system of piracy and internecine war. As such a system worked well in a small province it became evident that it would work better on a larger scale, and this was perhaps the controlling reason for adopting a national design law. At present, however, the fees for design patents in Switzerland are rather high, so that these manufacturers still maintain their local organizations, but the director promises a large reduction of fees in design cases in the near future, which it is confidently expected that every Swiss manufacturer will avail himself of the national law.

Generally speaking, only one design can be put into one design application, but 50 design applications can be had for a single fee. Variations in the design, so long as they do not alter the general appearance, fall within the patent. It will strike us as peculiar that there is no specific description or claim of any sort in design patents. The designs are simply placed in a package, which may or may not be sealed, and are registered without any search for novelty or any examination as to form, except as to the correction of any obvious mistakes which may exist.

The patentee in a design case may, as above indicated, file his designs in a sealed package which may not be opened for two years, except by an express order of the courts. During these two years the designs are, therefore, kept secret, although the patentee enjoys the protection of the patent. How manufacturers are then to ascertain what is patented it is difficult to see. In fact in one suit brought upon such secret design patent the court refused to award damages on the ground that the defendant had no means of knowing that there was a patent on the design of the article which he used. It seems clear that this secret feature of the law will have to be removed and the director considers that this will soon be done.

There are a few general provisions applying to both applications for inventions and for designs which are of interest. The first is that there is nothing in the law about interferences. Applications are kept in secret and so long as they are copending no applicant has any knowledge to what another applicant may be doing. If two applications then are co-pending two patents may be granted, but the burden of proof in the courts is upon him who was the second to apply. So, too, if he who is first to apply is the first to have his patent enrolled the attention of a second applicant co-pending with the first may be called to the fact of enrollment, but this is, of course, confidentjal, as above indicated, and the second applicant may still insist upon the grant of his patent. The provisions of the International Convention for the Protection of Industrial Property are also enforced so that an applicant receives priorty from the first day on which he applied for a patent in any one of the countries belonging to the convention. Thus, if an inventor filed his application in the United States on January 1, and in Switzerland on July 31, he would be given the benefit of the date of his United States application, and would, therefore, defeat the patent of another inventor who had applied in Switzerland on January 2, say. Whether the Swiss Government will still continue to do this when they find, as a matter-of-fact, that we in the United States can only date priority from the date of publication of foreign applications or patents, and not from their mere filing date, owing to the lack of legislative enactments for carrying into effect the provision of the International Convention, remains to be seen. In counting the actual time at which an application is filed in Switzerland, the Office takes the evidence of its time stamps, which are changed every 15 minutes. An applicant may, however, gain a few additional hours or even days by having the post office in Switzerland, at which he mails his application, not put the time of deposition upon the package; the Patent Office will then give the applicant the benefit of his mailing date and time.

One of the minor difficulties under which the Swiss Patent Office is laboring lies in the fact that applications may be filed in German, French, Italian, although but six patents have been granted up to the present time in the last named language. This requires that the examiners should be expert linguists as well as expert technologists. Furthermore, it renders the use of a typewriter impracticable, and it may be said that there is but one typewriting machine in the office, and that there are no stenographers. The system of flat files has been adopted for keeping the papers relating to any application, and when the patent is in condition for allowance separate jackets are made up of the patent papers, of the correspondence relating to form and of the correspondence relating to merits. The public is entitled to inspect the patent papers, but not the corresponding jackets. The courts are entitled to inspect the correspondence jacket, but not the jacket containing the letters on the subject of novelty.

A British Electric Carriage.

Messrs. Bloomfield and Garrard, of Coventry, England, have recently produced an electric carriage, described in *English Cycling* and illustrated herewith. The framework of the carriage is built throughout of weldless steel tubing. The two front wheels are steered by means of a long ball socket head, actuated by a wheel and tangent screw. The 24 inch wheels are shod with four inch pneumatic tires, and all working parts run upon ball bearings. Current is furnished by a series of 24 accumulator cells, which are fitted quite out of sight in boxes arranged beneath the seats. The whole carriage weighs about 1,000 pounds. The machine is calculated to run at a speed of three and one-half to 13½ miles per hour, according to the condition of the road. It has been tried upon the roads and, it is claimed, fulfills the anticipation of the inventors.

TELEPHONE NEWS AND COMMENT.

W. S. Weiant proposes to install a system of 400 telephones in Newark, O., at $2 a month each.

President Hudson, of the American Bell Telephone Company, is expected home from Europe on September 14.

The New England Telephone and Telegraph Company is planning to do a very considerable amount of underground work in the various cities of Massachusetts during the current year.

The German press is making vigorous protests in consequence of the rigorous application of an old regulation which prohibits a subscriber to a telephone exchange from allowing anyone not of his household to use the instrument. The withdrawal of the regulation is being asked for.

The New England Telephone and Telegraph Company now has about 80 per cent of its wires underground in Boston. The subway system is gradually being extended, and provision is being made for a greatly increased business with private residences and large office buildings.

Members of the city government of Louisville, Ky., were in Boston last week inspecting the plant of the New England Telephone and Telegraph Company and its underground wire system. The telephone company in Louisville is planning to do some extensive underground work at an early date.

Martin J. Carney has been appointed general superintendent of the Central Union Telephone Company. The appointment is a well deserved honor. Mr. Carney has been an unusually valuable employé, having occupied a number of positions, commencing at the bottom and climbing steadily to the top. Until recently he was assistant superintendent of the company.

"We used to think," said an old telephone man, "that the magneto 'phone wasn't much of an affair. This opinion gained ground as increasing attention was paid to other forms of instrument. Nowadays, however, we are beginning to realize the good points of the magneto. No better instrument for ordinary use could be desired, provided the parts are properly proportioned and disposed, and too many refinements are not introduced."

The Western Telephone Construction Company and the Central company, which now controls the city of Indianapolis, are fighting for a contract which the Board of Public Safety is thinking of awarding. The board wants some better police facilities in the telephone line, and the Western company agrees to construct 125 miles of wire and put in 100 telephones for $4,000. The Central company offers to do the same, and the board is thereby considerably embarrassed.

A large stockholder in the American Bell Telephone Company is quoted by the Boston *News Bureau* as follows: "There is actually invested in this country, either from invested capital or accumulated earnings, $90,000,000 in telephone plants. This does not earn seven per cent, and does not pay five per cent. The Bell Telephone Company as the parent company protects all the junior companies, makes all experiments, and like the senior member of a mercantile firm, naturally obtains the larger proportion of earnings. The Bell Telephone will probably never consent to have its new shares sold by auction. It may wait and appeal to the new legislature, or it may go out of the State." The company can by law offer its new stock to shareholders, at a market price fixed by the Commissioner of Corporations, pro rata to their holdings; all stock not taken to be sold by auction.

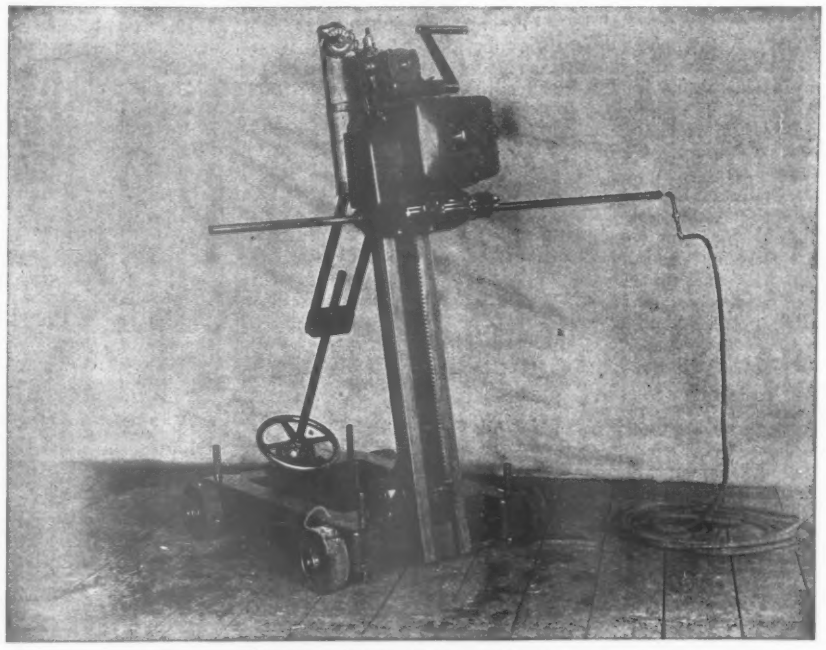
The Gilliland Telephone Company.

The Gilliland Telephone Company, of Chicago, are meeting with good success in the introduction of their telephone. The instrument is made in a substantial manner and is artistic in form, consisting of a magneto mounted on back-board with desk, bipolar magneto transmitter and telephone receiver with cord, and is sold outright at a fair price. Their central office and exchange system for towns and small cities is complete and comprehensive.

The president, Mr. W. H. McKinlock, and the general manager, Mr. J. J. Nate, have spent the greater portion of their lives in telephone and kindred electrical interests, securing therefrom a broad and valuable experience, which are very necessary factors to the advancement of telephone work, and there is no doubt that with the apparatus which this company is handling and the vast opportunities for work in the telephone field a successful future is assured. The other officers of the company are C. K. Wooster, vice-president, and F. R. Babcock, secretary.

Electric Gadder Diamond Drill.

An ingenious adaptation of quarrying by electricity is the electric gadder diamond drill recently put out by the General Electric Company. This machine of two kilowatt capacity possesses the invaluable advantages which should be inseparable from all machinery of this class—durability and simplicity which goes with a machine of very few parts. The table on which the actuating mechanism rests can be inclined at any angle with the floor and allowed a travel of seven feet parallel to its face. In addition the drill can be so lowered as to drill within two inches of the rock bed, and by a change in the driving and feed nut gears the automatic feed may be adjusted to the nature of the rock. The motor is provided with a reversing switch which, with a proper arrangement of gears, makes it possible to cut into a corner in either direction by reversing the feed screw in the feed device; that is, the gadder can cut either to its right or left side. The importance of this feature lies in the fact that it has been obtained by no other gadder drill without the use of complicated reversing gearing. It is provided with a quick return mechanism. While cutting into the rock the drill is fed slowly; in marble the speed is about one foot per minute. When it has reached the desired depth it can be given a quick back feed by the simple movement of a lever.



ELECTRIC GADDER DIAMOND DRILL.

The motor is of the ironclad, waterproof and dust-tight type, which has proved its durability under the most adverse circumstances. The end thrust of the feed screw in both directions is taken up by the ball thrust bearings. The drill rod can be made of any reasonaeble length up to 12 feet.

An advantage which this machine possesses over the steam or compressed air drill and one which will be appreciated by every marble quarryman, is that with the electrical gadder there can be no discoloration of the marble by flying oil. It is extremely cool and clean in operation compared with the steam drill and has a far superior efficiency. This superiority of efficiency means diminished coal bills.

The electrical gadder diamond drill can be operated on any power circuit, and its extreme simplicity brings it into the class devices which may be operated by ordinary labor.

Fire Doesn't Stop Siemens & Halske's Orders.

Since the disastrous fire at the Chicago works of the Siemens & Halske Electric Company of America, the company has closed six contracts for various classes of machinery. Two of the most important of these are for a large lighting plant in the Hotel Savoy, New York, and a power transmission plant for Franklin MacVeagh & Company, Chicago. We congratulate the Siemens & Halske Company on its pluck and skill in successfully carrying on its business after a conflagration that would have wound up many a less ably managed firm.

Detroit Contracts Confirmed.

The ELECTRICAL REVIEW is informed that on a reconsideration on August 14 by the Detroit, Mich., City Council of the contracts for apparatus for the city lighting plant awarded by the Lighting Commission, all the contracts were confirmed except that of the Western Electric Company, for dynamos. Among the contracts thus finally decided are those for Brush arc lamps and the Safety Insulated Wire and Cable Company's cables.

American Association for the Advancement of Science.

The forty-third meeting of the American Association for the Advancement of Science began in the Polytechnic Institute and the Academy of Music, Brooklyn, N. Y., on August 15, and will continue until August 23. The attendance has been very good and the papers interesting to those concerned. Nothing of especial interest to electrical people is included in the programme.

Fort Wayne Electric Corporation Leases the Wenstrom Factory.

As announced in the ELECTRICAL REVIEW for August 8, 1894, the Fort Wayne Electric Corporation has leased the factory of the Wenstrom company at Baltimore, Md., and has taken over the Wenstrom electric railway patents. The Fort Wayne people will enter the railway field well equipped and intend to push this branch of their business extensively.

LITERARY.

"The Flying Man," Herr Otto Lilienthal, of Berlin, and his flying machine will be treated of in *McClure's Magazine* for September by a writer who has been an eye-witness of Lilienthal's latest experiments in the art of flight. Pictures showing Lilienthal on the wing will accompany the article.

"Verbatim Report of the Twelfth Annual Meeting of the American Street Railway Association," held at Milwaukee, Wis., October 18 and 19, 1893, has been received.

"On the Development and Transmission of Power from Central Stations," by William Cawthorne Unwin, F. R. S. Longmans, Green & Company; 312 pages, 81 illustrations. Cloth, $3.50. Sent free on receipt of price by the ELECTRICAL REVIEW Publishing Company, 13 Park Row, New York.

This treatise is based on the course of lectures delivered before the Society of Arts by Professor Unwin in the early part of 1893. In their published form they have been revised and in some instances considerably amplified. An attempt has been made and, we think, a very successful one, to treat the subject as a whole. Great care has been taken to indicate what is essential in the consideration of schemes of power distribution, whatever the source of power and whatever the method of transmission adopted.

A Life Preserver Fitted With Electric Light.

The Allgemeine Elektricitäts Gesellschaft, of Berlin, is making a life buoy for use on board ship, which is fitted with an electric lamp so as to be visible at night in the water. The floating apparatus is made of waterproof linen, and is sufficient to bear the weight of three persons in the water, life belts being attached to the buoy. Inside the canvas buoy is a double wooden box containing an accumulator with gelatine material, and it is capable of feeding an incandescent lamp for six hours. The incandescent lamp surmounts the floating buoy in a strong wire frame, and is further protected by an outer strong glass globe. When the apparatus is hanging on board ship, the weight of the lower portion automatically switches off the current, but as soon as the buoy is released and dropped into the water four powerful springs switch the current on. The accumulator will last for two months before requiring to be recharged, so that the apparatus can be employed on board ship where there is no dynamo. The apparatus weighs about 100 pounds, but the accumulator can be made smaller with, of course, a corresponding decrease in the duration of the light. These accumulators with gelatine filling do not suffer from the motion of the ship, or from the fall into the water.

The Rose Polytechnic Institute.

The Rose Polytechnic Institute, of Terre Haute, Ind., is one of the very few endowed and thoroughly equipped colleges of the country devoted exclusively to the professional education of civil, mechanical and electrical engineers and chemists.

Though one of the youngest of these institutions, perhaps none of them has met with greater success in filling the present demand for professional training in electricity, regarded as one of the branches of mechanical engineering. It has been able to do this by reason of a fortunate combination of circumstances, which developed its plan of instruction and the purchase of its equipment just at the time that this public demand for electrical education became imperative.

ROSE POLYTECHNIC INSTITUTE, TERRE HAUTE, IND.

While this plan insists upon and fully develops the theoretical side of the instruction, and includes the modern languages as well, it lays especial emphasis on the practical side of technical education, as it is able to do throughout the whole course of four years by reason of ample shops, drafting rooms and laboratories, and an exceptionally complete outfit of instruments of precision.

The teaching force is so organized as to render shop practice most effective. It consists, in addition to the ordinary faculty of instruction, of a body of skilled workmen, or shop instructors, whose entire time is devoted to regular shop routine with the students. This makes it possible for students not only to complete the designs for machinery in the drafting rooms, but to build it in the shops, and also to test it in the laboratories. Such an education is modern and valuable. Not only are young men generally interested in such studies, but at graduation they are prepared to enter upon a useful professional career in connection with increasingly important business interests.

Lease of a Trolley Road.

The Carbondale, Pa., Traction Company, on August 1, leased for a period of 99 years, its line extending from Archibald to Carbondale, Pa., a distance of eight miles, to the Lackawanna Valley Rapid Transit Company, which will, at once, build a line to Forest City, six miles from Carbondale, and later on to Crystal Lake, a rapidly growing Summer resort. Additional boilers, engines, dynamos and rolling stock will be purchased at once. H. B. Jadwin is president; J. M. Nicol, treasurer; and D. J. Duncan is superintendent of the Lackawanna Valley Rapid Transit Company, with office at Carbondale, Pa. The company is backed by New York and Philadelphia capital.

That Clam Bake Invitation Has Come.

The ELECTRICAL REVIEW has received its invitation. Those few lines last week did the business. Thanks. Here it is:

You are invited to be present at the Sixteenth Annual Rhode Island Clam Dinner, tendered to the Electrical Fraternity by the American Electrical Works, of Providence, R. I., at Haute Rieve, on Saturday, August 25, 1894. Lunch at 11.30; Bake opens at 2. Eugene F. Phillips, president.

Honorary Committee: Nelson W. Aldrich, Providence; S. S. Wheeler, New York; F. A. Gilbert, Boston; E. B. Baker, New Haven; Lemuel Bannister, Pittsburgh; Henry F. Woods, Boston; John I. Sabin, San Francisco; A. C. White, Providence.

Reception Committee: W. A. Hathaway, C. H. Wagenseil, F. B. Baker, W. H. Sawyer, C. R. Remington, Jr., A. L. Capper, E. Rowland Phillips, P. C. Ackerman, F. E. Donohoe, John Carroll.

The Colorado Springs, Colo., Rapid Transit Company has brought suit in the Federal Court against the General Electric Company for $20,000 damages. The complaint alleges that the plaintiff had a contract with the General Electric Company to furnish certain machinery for operating a plant in Colorado Springs. It is claimed that the machinery has failed to do its work and that the plaintiff company has suffered great damage thereby.

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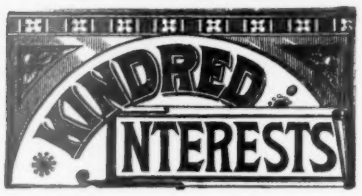

John Starr, Son & Company, Limited, Halifax, N. S., are sending out a neat little pamphlet describing the "Unique" telephone, of which they are sole manufacturers. This instrument is sold outright.

The Manhattan General Construction Company report that the sales of the Fleming wire gauze dynamo brush are exceedingly satisfactory for this dull season of the year. A trial order of this brush is solicited from the companies for their Fall business.

Harris & Williamson, Birmingham, Ala., are sending out some tastefully prepared circulars illustrating and describing the Partrick & Carter Company's electrical house goods, for which they are sole agents, the Detroit motors and generators and the Ecomagneto watchman's clock, for which they are sole Alabama agents.

The Westinghouse Electric and Manufacturing Company, Pittsburgh, has issued a most commendable illustrated pamphlet describing its multipolar generators and motors. The reading matter is more interesting and forceful than is usual in trade literature, and several useful tables are included in the text.

The Berlin Iron Bridge Company, of East Berlin, Conn., are putting up a gas house roof for the New Jersey Gas and Construction Company, at South Amboy, N. J. The Worthington Hydraulic Works, at Brooklyn, N. Y., have decided to make large additions to their already extensive plant and have placed the contract for this work with the Berlin Iron Bridge Company.

The Joseph Dixon Crucible Company, Jersey City, N. J., manufacturers of lead pencils, crucibles, stove polish and other graphite products, have felt the necessity of stiffening the backbones of their salesmen who have complained of competitors' cut prices, and do it after the following fashion: In times like these, when work is none too plenty, and the manufacturer is anxious for orders and the salesman likewise, there is great temptation to cut prices for the sake of getting a quantity of business and thereby deluding ourselves into the idea that we are prosperous because we are busy, forgetful of the fact that the more business one does at a loss the slimmer will be the bank account at the end of the year. Prices once broken down are hard to re-establish and it is even doubtful if they can be re-established. Furthermore, a manufacturer who once gets the reputation of making cheap goods will find it difficult to obtain good prices even for his best goods, and fine products at good prices are always in fair demand at all times. There is neither money nor reputation to be gained in doing work for less than a fair price, and the very men who profit by beating the salesman down and by inducing him to enter their order at cut-throat competition prices, respect him less and respect his house less than if he had stuck manfully to the principle that first-class goods demand a fair price.

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